STIMULANTS

AND

NARCOTICS.

BY

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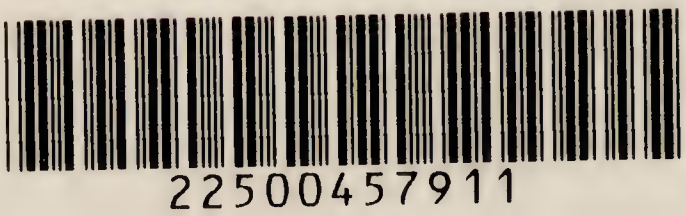

STIMULANTS AND NARCOTICS.

FIRST LECTURE.

Mr. Chairman, Ladies, and Gentlemen,—The object of this lecture is to lay before you in a clear and popular manner the effects of alcoholic liquors upon the animal economy; but, in order to prepare your minds for a due appreciation of the subject, we must first direct our attention to "stimulants and narcotics" in general. My first step is to explain to you the exact signification of the words "stimulant" and "narcotic," as applied to medicinal agents.

In common *parlance*, a narcotic means an agent capable of producing sleep, whereas the term stimulant is generally applied to those agents which rouse up the nervous system to a greater exhibition of energy.

If your horse moves slowly, either from laziness or on account of the length of his journey, a prompt application of whip or spur will urge him to make greater exertion. In this case the whip or spur is the stimulant.

If you feel fatigued with walking, or muscular labour of any kind, a glass of beer or a little brandy and water will remove the sense of fatigue, and act as a stimulus to your nervous system, bestowing a feeling of newly-acquired strength, which sends you back to your work almost as fresh as when you started.

If your head feels "stupid" and dull from long study or much mental worry, so that you are quite unable to compel your thoughts to follow the subject in which you are engaged, a glass of wine will immediately enable you to proceed with your work. Such is

the effect of a stimulant; it removes the feeling of laziness or exhaustion, and spurs on the nervous system to renewed exertion.

When the schoolboy runs behind his companion, and administers a prick with an unsuspected pin, he uses a stimulant which liberates an immense amount of energy throughout the entire playground. The two boys at once confront each other in attitude of battle, and, if well matched, their struggle will probably continue until mutual exhaustion compels them to desist. Then as they drag their weary limbs homeward from the village-school, appearing and feeling scarcely able to crawl along, they see rushing towards them a maddened bull from the nearest farmyard. In a moment, as if transformed by the wand of a fairy, they start to their heels and make off as nimbly as ever their legs have carried them. They rush to the nearest wall, and, in the twinkling of an eye, are out of reach of the furious animal. The fear of being gored to death was a stronger stimulant than had yet been applied; under its influence they performed prodigies of strength and fleetness, which a moment previously seemed utterly beyond their power.

And here I desire to impress upon you the fact that a true stimulant imparts no power whatever to the body. It merely compels the brain, or muscles, or other portion of the organism, to liberate the energy which is stored up therein. The whip gives no strength to the horse; the fear of the mad bull infused no new force into the worn-out schoolboys. And I hope to show you that the same is true of all pure stimulants of whatever kind. In particular, I hope to make clear to you that the stimulating power of alcohol, which is the principal substance that will engage our attention this evening, is exactly the same in kind as that of the whip, and that of the terror produced by the bull. A narcotic, on the other hand, does not prime you for fresh exertion; its effect is of an entirely opposite character. Instead of producing a feeling of renewed vigour, it creates a sensation of exhaustion, and induces a pleasant condition of drowsiness, which may or may not be followed by complete unconsciousness. The most familiar example of a drug narcotic is opium—a juice obtained from certain "poppy-heads." Morphia is an active principle yielded by opium, and laudanum is opium dissolved in spirit. So that whether you take crude opium, laudanum or morphia, the same effects, more

or less, are produced, viz., feelings of languor, want of power, and a tendency to sleep.

If you have been reading or writing too long about some interesting question, or should you feel worried and harassed about business, the brain will frequently refuse to cease acting. You go to bed and resolutely close your eyes, but no sleep comes; you count a hundred or a thousand in order to divert your thoughts from the subjects which have engaged your attention during the evening; but even that charm leaves you as wide awake as before. It is in such circumstances that men are tempted to take a dose of morphia or chloral, and the effect is frequently miraculous. In a short time the condition of restlessness is entirely removed, and is succeeded by a comfortable sensation of exhaustion and drowsiness. But the so-called sleep produced by a narcotic is by no means so refreshing as the undrugged repose which is earned by vigorous exercise or labour in the open air. For my own part, I would rather lie awake all night through, than bring on sleep by any drug whatever. If my brain is at any time too active to permit me to enjoy natural slumber, I attempt to repress its activity by the sedative influence of a cold head-bath gently applied; and if this means fail I go out for a short walk in the open-air. The best sleep-producer is open-air exercise. No other bestows such natural repose, or makes you feel so fresh and ready for work on the following day. Among ladies, tea-drinking in the evening is a very common cause of sleeplessness. This is due to the stimulating properties of the tea which, in the case of those of nervous temperament, continue to exert their influence for many hours after being taken. Those in whom tea produces this effect ought to drink it much earlier in the evening than is their usual custom, for when its stimulating power is exhausted, a slight narcotic influence follows. In very many cases of confirmed sleeplessness, I have found a complete cure effected by the discontinuance of tea-drinking and the adoption of a short daily walk in the open-air.

So far we have been considering the effects of stimulants and narcotics upon the nervous system as a whole. Let us now direct our attention to their influence when excited upon a single nerve. A nerve may be regarded as an animated telegraphic wire, which is capable of conveying only a limited number of

messages. The nervous power which enables it to transmit a message is termed irritability, and a portion of this irritability is exhausted in sending every message, so that if you compel the nerve to perform a large amount of work, you will sooner or later find that its energy has become exhausted. In other words, the nerve will have become paralysed, and is unable to convey another message until it has had sufficient time to store up a fresh supply of energy.

This is the reason why you cannot keep a nerve in operation night and day as you can a telegraphic wire. Suppose you administer a stimulant to the animal whose nerve is under observation, you will discover that, after a small dose, messages can be sent along the nerve with greater ease than when no stimulant has been given ; but you will also find that the amount of work done by the nerve when under the influence of a "stimulant" is much less than when no "stimulant" has been administered. The "stimulant" has the power of liberating the energy resident in the nervous structure. While this liberation of energy is taking place, work is more easily done ; but when the direct effect of the "stimulant" has died away, the exhaustion of the nerve-power is out of all proportion greater than the work performed. And if you administer a sufficiently large quantity of stimulant, you may liberate the entire volume of nervous energy so rapidly that the nerve will be rendered incapable of performing any work whatever. A stimulant, then, does not communicate energy to the nervous system, but has a directly opposite effect, although its primary action exalts the irritability of the nerve tissue, and enables work to be done for a short time with less apparent effort.

Now, I am well aware that this view of stimulus is combated by Dr. Anstie and other able writers. Dr. Anstie held that alcohol not only produced an evolution of nervous energy, but supplied the force necessary for such an exhibition of power ; and he believed that this force was generated by the oxidation of alcohol (*i.e.*, its combustion) within the organism. I believe that alcohol is oxidised within the animal body, but that it supplies more than the merest fraction of the force which it calls into operation I most unhesitatingly deny.

To rob a man of a sovereign, give him back a shilling, and

expect him to be satisfied, would be as reasonable as to suppose that the excessively low form of oxidation which alcohol undergoes within the organism, can possibly supply the amount of energy which its stimulant action liberates.

Those who maintain that alcohol burns within the body with a considerable evolution of energy, ignore the fact, so ably pointed out by Dr. Richardson, that alcohol, immediately on its introduction to the animal body, saturates itself with the water which it finds abundantly pervading all the tissues. Thus, if they would discover how much energy alcohol really generates within the system, they must attempt to burn it when saturated with water. Dr. Richardson informs us that under such circumstances the energy is so inconsiderable as to be practically of no avail in the economy.

Moreover, it is abundantly proved that alcohol, unless taken in small doses and at considerable intervals, decidedly lowers the animal temperature—a result which could not follow its administration if it supplied as much energy as it calls forth from the nervous system. Every medical practitioner who is familiar with the use of the thermometer knows that the temperature of those who drink alcohol to the exclusion of ordinary diet, is distinctly lower than that of his other patients. Now, if alcohol really supplied the amount of heat or energy which it is said to be capable of producing, such excessive drinkers ought to exist in a condition of continuous febrile heat.

Many years ago attention was drawn to this point by Dr. F. R. Lees, and it has lately been settled on a scientific basis by Dr. B. W. Richardson.

The opponents of this view of stimulus further argue that if alcohol does not supply energy sufficient to make up for what it liberates, then every successive dose must necessarily produce greater and greater depression, until ultimately death must, in many cases, ensue from excessive liberation of nerve force. And they say that such does not accord with our experience of stimulants in inflammatory and febrile diseases. Now I am fully prepared to say that my experience of the treatment of fever and inflammation by large doses of stimulants is precisely what has just been referred to—viz., that every successive dose produces greater and greater exhaustion until death, in very many cases,

takes place from intense nervous depression, just as if the patient had sunk from narcotic poisoning, as is indeed the case.

I do not deny that many cases of fever and inflammation recover after such treatment; but that does not necessarily prove the efficiency of the remedy employed. In the old days of excessive bleeding, only one case out of every three of inflammation of the lungs ended fatally; but the fact that two out of every three recovered was not considered sufficient evidence in its favour to prevent the utter condemnation of the bleeding treatment when it was discovered that only one out of every thirty-two died when no blood was abstracted. When I have in former years been compelled as a junior practitioner to bow to the dictation of some elder in my profession, I have seen patients literally stimulated to death. I am happy to say that such treatment is already on the wane, and that all the better educated men in the medical profession are giving evidence of more faith in nature, and less faith in drugs of every kind.

But we are able to adduce the proof of experience that the doctrine of stimulus herein upheld is in accordance with scientific fact.

I am informed by a soldier who has served many years in India, that he distinctly experienced the exhausting power of alcohol in his own person when undergoing severe marches. One day, for some reason, he did not receive his usual allowance of rum in the middle of his day's march. When he arrived at the halting place, he felt much less exhausted than on previous days —an experience quite opposed to his own expectations and those of his comrades. The next day he and several of his friends determined to keep their rum until the march was finished; which they did, with the same result as in the case of my informant on the previous day. They then begged and obtained permission of their commanding officer to drink their rum regularly after the march was ended. These men were not fanatic teetotalers; they did not wish to give up their rum; but they felt its power to exhaust their nervous energy, and thus to unfit them for severe exertion, therefore they preferred to drink it as a sleeping draught when their work was done.

In support of this soldier's statement I am happy to be able to quote the opinion of the commanding officer of this district, General Robertson, C.B. At the Mayor's tea party, in honour of the members of the Church of England Temperance Society, this distinguished officer, in speaking of the possibility of war, remarked, "that it might not be inappropriate to the occasion which had gathered them together to say that he hoped that among the preparations that would be necessary to fit and equip the army, a preparation hitherto considered necessary would be omitted—namely, the povision of rations of rum for the men. He did not think it did any good at all when work had to be done.

He was not a teetotaler, but whenever he had had any work to do, like a march or anything of that sort, he drank nothing but water, and he considered spirits a mere luxury."

Moreover, we are informed by Dr. Parkes, the highest authority on such matters, that in the Ashantee campaign of 1874, "alcohol was injurious to the soldiers while on the march, the reviving effect passing off after, at the utmost, two and a-half miles march had been accomplished, and being succeeded by languor and exhaustion as great or greater than before. When again resorted to its reviving power was less marked; and its narcotising influence was often traceable in the dulness, unwillingness to march, and loss of cheerfulness of the men. Meat extract, on the contrary, in quantities of not less than half an ounce at a time, was not only powerfully reviving, but also sustaining, and so was coffee, though to a considerably less extent." Hannibal and his warlike Carthagenian followers, who came so near to destroying the power of the old Romans, never drank wine when out on military service. These ancient warriors enjoyed their wine as a luxury, and used it as a medicine; but they exercised too much keen observation to be led away by the idea that a narcotic could impart strength to the human frame.

In the face of such well-attested facts and experiences as I have just narrated, it is quite impossible to believe that alcohol adds the smallest amount of energy to any man, either healthy or diseased. Moreover, the evidence just adduced strongly supports the conclusion that it is not merely useless for such a purpose, but that it is positively injurious.

The reason of its baneful effect lies in the fact that it liberates nervous energy more rapidly than it can be made use of, and thus, when the energy is desiderated for further exertion it is not forthcoming. In fact, it spends nerve-power as quickly as it is spent when a man is undergoing hard bodily or mental labour. If, therefore, any man works hard and drinks hard at the same time he will feel doubly exhausted when his day comes to an end.

It is on account of this power to exhaust energy that a large dose of "stimulant" produces the same effect as an ordinary dose of a "narcotic."

How many business men are there, and professional men also, who cannot sleep without their whisky-and-water at bedtime, and who, therefore, take their so-called "stimulant," that it may produce the effects usually ascribed to a "narcotic."

This brings me to the most important piece of information which I have to impart, and for which you must by this time be fully prepared—viz., that *every stimulant is a narcotic, and every narcotic is a stimulant.*

This may appear paradoxical, nevertheless it is the very essence of truth, and if this truth were generally known it would save

thousands of useful lives annually. But I must leave the consideration of this proposition for a future lecture, as I have already occupied my full time.

SECOND LECTURE.

Mr. Chairman, Ladies, and Gentlemen,—In my last lecture I endeavoured to explain to you the generally-accepted signification of the terms "stimulant" and "narcotic," and also to show you the manner in which these agents produce their peculiar effects upon the nervous system. I laid before you what appear to me satisfactory reasons for the belief that a "stimulant" adds no power whatever to the animal body, but that it seems to do so by its ability to liberate the energy which is resident in the tissues. I also pointed out to you that a large dose of a stimulant produces a narcotic or paralysing effect, while a small dose of a narcotic exercises a stimulating influence. And this led me to the first proposition which I desire to lay before you this evening—viz., that every stimulant is a narcotic and every narcotic a stimulant. It is not difficult to understand how the same agent may act both as a stimulant and as a narcotic. Suppose, for example, that you are lying about your house on a Sunday afternoon, languid and listless. You set out for a walk in the park, but the sedative effects of a hearty meal deprive you of all inclination for exertion. You persevere, however, and ere long the fresh air and gentle exercise brace you up to such a degree that you prolong your walk perhaps for many miles into the country. On your return you experience more or less exhaustion, and you sleep much more soundly than you would have done had you not exposed yourself to the stimulating influence of the country breezes. Thus it is plain that exercise and fresh air may act both as a stimulant and as a narcotic. In the same manner the whip and spur when applied to the unwilling horse not only compel him to greater exertion, but are the means of obtaining for him a good night's rest; for he certainly sleeps better after a good gallop than he would have done had he been permitted to stand all day in his stall, or had he been allowed to jog along at his own lazy pace, without interference on the part of his rider.

A good example of a single agent, producing first a stimulant and afterwards a narcotic influence upon the nervous system, is found in the effect of cold upon the human body. What produces a more stimulating influence upon the nerves of the skin, and, through them, on the brain, spinal cord, and ganglionic nervous system, than a plunge into your cold bath, before entering upon the duties of the day? It braces you up for exertion to such an extent that you feel able for any amount of

arduous labour, and, if you have not remained too long in the water, you are none the worse for your morning stimulus. If, however, you expose yourself for a considerable length of time to the influence of cold, either in your bath or otherwise, the effect is injurious instead of beneficial. The stimulating influence will have been so great that it will soon produce more or less of a narcotic effect. Just as certainly as exercise creates exhaustion, so surely will antecedent stimulation result in subsequent narcotism; so that if you have been much exposed to the stimulating influence of cold, you will find yourself dull and sleepful several hours earlier than you are wont. If the cold should be very intense, and your nervous energy easily exhausted, the time of stimulation will be short, and it may be painful, and will be rapidly succeeded by extreme narcotism. But there must always be a period, however short, of stimulation, previous to that complete exhaustion of nervous power which is termed narcotism. It is during the period of stimulation that nervous energy is being expended, and unless a certain amount of energy is exhausted narcotism cannot supervene. *Cæteris paribus*, then, the smaller the amount of energy possessed by the organism, and the greater the degree of cold applied to that organism, the shorter will be the period of stimulation, and the sooner will it terminate in a state of narcotism. We have striking examples afforded us of the narcotic power of cold in the experience of those who have visited the Arctic regions. When these travellers have been exposed to intense cold for a length of time they are frequently seized by an irresistible impulse to lie down and sleep in the snow, and sometimes it is almost impossible for their companions to compel them to continue their march. So long as muscular exertion is kept up there is sufficient heat generated by the increased oxidation of the food and tissues to prevent death; but as soon as the traveller ceases to move, the low temperature causes a rapid evolution of the entire nervous energy, and thus narcotism and death speedily follow.

The stimulating effects of cold are experienced when we find ourselves in a damp bed or with an insufficient supply of blankets. Then, indeed, we have no excessive tendency to sleep; but, on the contrary, we roll over and over all night long in miserable wakefulness. And if by reason of excessive exhaustion we sink into slumber in spite of the cold, we are almost certain to awake next morning with the seeds of an internal inflammation sown within us. Put into the same bed a stronger man, whose heat-producing power is very considerable, and the cold will not cause him the slightest inconvenience. He will sleep soundly, and on awaking will be refreshed and benefited. In his "Ride to Khiva," Captain Burnaby supplies us with many examples both of the stimulant and narcotic power of low temperature. "On one occasion," he says, "we threw ourselves down upon the snow

and tried to sleep. No fire could be made, as there were no brambles in the neighbourhood, and the cold, which was becoming very intense, penetrated through my sheepskin clothes. It was impossible to go to sleep, the frost not being of that violent nature which utterly prostrates a man, although it was quite sufficient to make me feel very uncomfortable. However, the guide seemed to be impervious to the weather, whilst some loud snoring informed me that he was lost to consciousness. . . . Lighting a cigarette, I walked up and down, straining my eyes in the direction of our gradually-approaching caravan. I was looking forward to the moment when we could once more trot onwards, the rough motion of the horse, frostbites and all, not being so hard to bear as this wearisome onslaught of the elements, which utterly prevented slumber."

Now, if Captain Burnaby had indulged in some alcoholic stimulant to "keep out the cold" he would soon have been stretched alongside of his guide sound asleep; but it is highly probable that from that sleep he would never have awakened. The stimulus of the cold, assisted by the stimulus of the alcohol, would have exhausted his energy to such an extent as to produce in all likelihood a condition of fatal narcotism. On this point we have Captain Burnaby's own testimony. He informs us that the most suitable drink for those who are exposed to a very low temperature is "boiling tea." He says, "this beverage becomes an absolute necessity when riding across the (Russian) steppes in mid-winter, and is far superior in heat-giving properties to any wines or spirits. In fact, a traveller would succumb to the cold on the latter when the former will save his life." This evidence is quite in accordance with scientific fact in so far as alcohol is concerned, it having been conclusively proved that the effect of alcohol is not to increase, but rather to diminish the heat of the body. With regard to the heat-producing properties of tea no exact experiments have been made—the fact of its being less injurious than alcohol during exposure to cold proves nothing whatever, seeing that alcohol, instead of imparting heat, exercises its influence in the opposite direction. From careful scientific experiments, conducted by Dr. Alexander Bennett, it has been demonstrated that tea produces a condition of narcotism when its stimulating effects have passed off. Therefore I am persuaded that the principal heat-giving agent in Captain Burnaby's "boiling tea" is the boiling water in which it was infused. Practically I do not think that much harm will be produced by tea under such circumstances, because its stimulating power is very slight, but that it generates any increased heat in the organism must be scientifically denied. The Indian porters of South America, when about to undergo severe exertion, drink nothing but water as hot as the stomach will bear. They seem to have discovered empirically one of the most important of scientific truths—viz.,

that heat is one form of energy. And my belief is that Captain Burnaby and his train would have suffered slightly less from the cold had they drunk their hot water without any admixture of tea. As an example of the stimulant influence of cold we may instance the following. A courier informed the captain that "the wind was the main difficulty (in travelling in cold climes), for, cutting keenly against the horses' faces, it caused them so much pain that the poor beasts could not face it. This, he said, was the reason that travellers found themselves so constantly driving off the track."

The pain is produced by the stimulating effect of the cold upon the sensitive nerves of the skin. If the animals were driven forward in spite of this suffering, these sensitive nerves would become paralysed, and no pain whatever would be experienced; and if this condition were not interfered with, the portions of skin thus affected would lose their vitality—in other words, would become frost-bitten. The stimulus of the cold has compelled these nerves and portions of skin to give out all their inherent energy, and when any part of animal tissue has expended all its energy, its life is at an end. It must then be thrown off, and an ulcer will remain in its place until new tissue be supplied by the surrounding parts.

Here is another extract to impress upon you the narcotic power of cold. Captain Burnaby says:—"The evening wore on, and one by one our party lay down to sleep, or to find what rest they could obtain on the wooden planks of the floor (of a Russian station). In spite of the hardness of the boards, we were all speedily plunged in the arms of Morpheus, the cold winds and exposure having taken more out of me than any other clime which I had hitherto experienced. The burning rays of a tropical sun on an African Sahara dry up the sap of the human frame. A long camel journey fatigues the rider, but nothing like the pitiless cold and physical suffering which inevitably accompany a winter tour in Russia."

From the above-quoted instances it may be plainly perceived that cold acts upon the human body both as a stimulant and as a narcotic, and I maintain that its narcotic effects are entirely dependent upon its stimulating power. A nerve is in a state of narcotism when its energy is more or less exhausted; and as every stimulant produces its peculiar effects by liberating nerve energy, it must of necessity produce more or less narcotism when its stimulating power is exhausted. The mode of action of a "narcotic" is exactly the same as that of a "stimulant;" but the power of the former to liberate nerve energy is so great that it very soon exhausts the irritability of the nervous system, and narcotism sets in much more rapidly than when a so-called stimulant is administered. A stimulant produces narcotism after a long period of stimulation, while a narcotic produces narcotism after a very short

period of more energetic stimulation. Stimulants, then, are simply weak narcotics; and narcotics, on the other hand, are strong stimulants.

Tobacco is generally classed among the narcotics, nevertheless its first effect is decidedly that of a stimulant. In some men a few whiffs from the pipe will stimulate the nerves of the stomach so as to sharpen the appetite; but, as the indulgence is continued, these nerves become paralysed, and the craving for food passes away.

Some years ago I met with a very remarkable case, which proves the stimulating power of tobacco. A gentleman in good position had just returned home from a dinner party where he had indulged very moderately. He sat down in his smoking-room on his return to enjoy a few whiffs of tobacco before retiring to rest. He had been merry previously, but now he became furious and excited, and was with difficulty restrained from murdering his wife and children. When next morning he was informed of what he had attempted he was quite thunderstruck, and vowed that he would never again run the risk of being a murderer. He was one of the most abstemious men—not to be a total abstainer—that I have known, and yet this one mistake might have terminated in a fearful tragedy. Had he imbibed more alcohol, or had he continued his smoke some time longer, the narcotic effect would have been produced, and complete unconsciousness would have prevented such maniacal excitement.

Such a case as the above shows that tobacco first produces a stimulant and then a narcotic effect, or, in other words, that it produces its narcotic effect by means of its power to liberate nervous energy.

With chloroform, which is generally looked upon as a narcotic, we find the same stimulating influence preceding its narcotic effects. Those who are in the habit of administering chloroform have abundant examples of its stimulating power, as it frequently requires considerable exercise of force to restrain the patient during the stage of stimulation. And the feeling of exhaustion which is experienced by those to whom it has been administered is sufficient proof that it produces its narcotic effect by previously inducing a rapid expenditure of nerve-power.

It is the same with alcohol. When you take a small quantity you experience its stimulating power; but when you take a large quantity it puts you to sleep. A comparatively small dose of morphia acts as a narcotic; but if you take a still smaller amount, it acts as a stimulant and keeps you awake.

This is the reason that so-called stimulants produce such various effects upon different persons. The same quantity of the same alcoholic liquor makes one man uproarious, while in his neighbour it produces merely a feeling of comfort. Pitt could electrify the House of Commons after his second bottle of port; whereas Sheridan, after an equal potation, would have been utterly unable

to hold up his head. Both the stimulant and narcotic effects are more easily produced upon one man's nerves than upon those of his more sensitive neighbour.

One of the most powerful narcotics at present known has been proved to be a stimulant when used in sufficiently small quantity. This poison—called curara,—produces a rapidly fatal narcotic effect upon man and other animals, even when administered in small doses. It was doubted whether curara could ever exercise the smallest stimulating effect, however minute the quantity given. But M. Brown-Sequard, a great French physiologist, has settled this point in the affirmative. He injected a very small amount of the poison into an animal, and watched the effects produced on its nerves.

At first the nerves became very easily excited, but, in a short time complete paralysis set in, so that the animal could not move. In fact, all the latest scientific experiments tend to confirm the truth of the proposition which I now lay before you—viz., that all stimulants are narcotics and all narcotics stimulants ; or, in other words, that stimulant and narcotic effects are not independent phenomena produced by two different classes of agents, but that these phenomena are inseparably connected, both being the necessary effects of the same class of agents, and both being manifested in an invariable sequence, so that stimulus always precedes narcotism, and, more or less, narcotism invariably follows stimulus. And such being the case, it must be evident to all that the occasions must be exceedingly rare on which a stimulant will be really useful to any man whether in health or disease. Since I became convinced of the truth of this principle, I have had abundant opportunity of testing its correctness in the conducting of a large and varied private practice in Liverpool during the last six years. And my predecessor and former partner, Dr. Burrows, who conducted the same practice for nearly forty years previously, gives similar evidence—at least in so far as alcoholic stimulants are concerned.

What, then, are the circumstances in which a stimulant (either alcoholic or otherwise) may prove useful ? Suppose that a medical man satisfies himself that he has to do with a derangement of some organ, or of the system generally, which may be removed by the temporary excitement of the nervous system, then he will feel bound to administer a stimulant in one form or another. But if the diseased condition is not cured before the stimulation has produced symptoms of commencing narcotism, the patient will be in a much worse plight than had nature been allowed to manage the cure in her own way. For it must always be borne in mind that the usual termination of disease is not death or loss of function, but recovery, and unless the physician unites his efforts with those of nature he will do harm instead of good. But, even although his efforts be exerted in the proper direction, he will

still do positive and irretrievable injury if he miscalculate the amount of stimulation which the nervous system will bear, through ignorance of the fact that every stimulant is a narcotic. The driver must have good grounds for believing that his horse will not become exhausted ere he reach the summit of the hill before he urges the animal with the lash to drag his load straight from the bottom to the top. If he doubts the horse's strength he gives the poor animal longer time, and leads him gently by a zigzag course. In the same way the careful physician will refrain from administering a stimulant to any patient whose nervous energy is very deficient, and he will by innumerable devices endeavour to smooth the way, so that nature may have as little difficulty as possible in effecting a cure. A stimulant, then, is only admissible when there is a good supply of latent nervous energy which nature is sluggish in bringing into operation, and it will rarely be useful except when a cure can be effected in a short time.

When stimulation is carried on for weeks, months, or years, its effect is in every respect pernicious, and cannot be too strongly reprehended ; for then it produces a chronic condition of partial narcotism in those delicate portions of the nervous system which are intimately connected with the nutrition of the tissues.

These effects are produced not merely by alcohol (although its effects are most frequently observed on account of its extensive consumption) but by all other stimulants. Tea, coffee, tobacco, ammonia, quinine, opium, and excessive mental excitement (either from business or pleasure)—all these have a paralysing effect upon the more delicate portions of the nervous system. When nature is endeavouring to put new energy into the injured nerves, a feeling of discomfort and unrest is experienced by the patient, and to dispel such a depressing sensation a renewed application is made to the cause of the distress. The effect of the stimulant is to reproduce the paralysed condition, and thus repair of the nerve tissue is effectually prevented. This succession of paralysis and stimulation goes on month after month and year after year, in many cases, until the health is completely broken and the constitution ruined, without the patient ever exceeding the bounds of, to all appearance, the strictest moderation in the use of alcohol. Seeing that mental excitement acts in the same way upon the nervous system as alcoholic and other stimulants, it must be evident that any man who has much excitement or worry, either in business or otherwise, or whose work directly produces nervous exhaustion, ought to avoid as far as possible all extra stimulation.

Those who enjoy perfect health, who live much in the open air, and who have no business worries or family troubles, may drink alcohol in almost any form without apparent injury, at least for a considerable length of time ; but whenever the nervous energy

begins to fail, either from disease or otherwise, or when healthy country life is exchanged for the enervating atmosphere and excitement of the town, then the pernicious influence of the stimulant begins to make itself felt. If professional and business men, who have injured their health by using up an excessive amount of energy, could be got to understand that it is not tonics and stimulants which they require, but rest and fresh air, there would be saved to the community many useful lives which are now sacrificed through ignorance and prejudice.

The next proposition which I wish to lay before you is that a certain dose either of alcohol or other stimulant may produce a stimulating effect upon one portion of the nervous system and a narcotic effect upon another portion in the same person at the same moment. This depends upon the difference of delicacy between one set of nerves and another. Some nerves are much more easily stimulated and are therefore much more quickly paralysed than others. Why is it that the same quantity of brandy-and-water, which stays the appetite of a hungry man, makes him continue his work with greater ease than previously? The nerves of the stomach have been paralysed, so that they cannot express the wants of that organ; but certain portions of the brain and spinal cord have been stimulated to a greater exhibition of energy. If the brandy-and-water had produced the same effect upon the brain and spinal cord that it has produced upon the nerves of the stomach, the man would have been reduced to a state of complete intoxication. The brain and spinal cord will, to a certain extent, suffer a sedative influence when the stimulant effect has passed off, so that, unless the man gets his work accomplished before that time, he will be compelled either to renew the stimulus or cease from further exertion. If, instead of the brandy, the man had taken food and rest, he would probably have been able to do double the amount of work with less exhaustion. I may here remark that a *very small amount* of alcohol would have the effect of increasing the appetite by its stimulating effect upon the gastric nerves; but when the stimulating effect had died away, slight nerve paralysis would set in, and thus digestion would be seriously interfered with. Many an epicure is led to believe that alcohol materially aids his digestive organs, when in reality it merely exerts a narcotic influence upon the gastric nerves, and thus prevents him experiencing any dyspeptic inconvenience. The dyspepsia is not removed, it is merely disguised, and will at some future time break forth with uncontrollable severity.

The comfort experienced by the worn-out merchant after his evening potation is the result of the combined stimulant and narcotic effect of the alcohol imbibed. Those nerves which inform us that we have done enough of work, and make us feel uncomfortable so as to prevent us doing too much, are very quickly paralysed

by a small amount of alcohol. But the quantity which paralyses such nerves is just sufficient to exert a stimulating influence upon certain portions of the brain ; hence there follows both freedom from uneasiness and positive stimulation besides. When the merchant has been led to understand that his sherry and whisky-and-water deprive his nervous system of as much energy as a few hours' extra work, he will either give it up entirely, or, at all events, he will only drink it as a luxury and at such times as he can well spare the loss of nervous energy to which it gives rise. Those portions of the nervous system which convey to us the most delicate impressions are most easily paralysed. Take, for example, the nerves which inform us, from looks, tones, accents, and movements, what people are thinking about us. You notice a young man who goes out to an evening party among entire strangers. At first he feels very bashful and "conscious" of himself. He cannot get himself into an easy posture. He doesn't know what to with his hands; they seem such a burden, so awkward and so useless. He thinks everybody is looking at him, and he cannot think of anything to say to anybody. How differently he feels after his second glass of wine. The "conscious" feeling is banished ; he is at ease with himself and all the world besides ; and he gives forth his opinions with a boldness which is quite astonishing to those who have witnessed his embarrassment half-an-hour previously. He has no longer the notion that others are invidiously glancing at him. On the contrary, you may soon make a joke at his expense without his being able to detect that you are laughing at him. One portion of his nervous system has already become paralysed, while other portions are as yet undergoing stimulation.

When alcohol is indulged in to excess, even the least sensitive portions of the nervous system become more or less paralysed ; but a very moderate quantity disables a man from distinguishing with accuracy the modulations of sound ; it diminishes his sensibility to light, and renders his sense of touch less accurate. All this may take place while he is at the same time bright and cheerful, and showing no symptom whatever of having had "a drop more than is good for him." Every abstainer must have remarked the pointlessness of the jokes, and the inane character of the general conversation which delights many moderate drinkers after dinner, even although they are men of considerable intelligence and attainments. And most literary and scientific men have noticed that they are unable to perform work requiring severe exactitude of detail after they have indulged to a very small extent in alcoholic liquor. I am informed by an eminent architect that whenever he takes a "stimulant" to enable him to proceed with work which involves careful calculation, he is invariably compelled to lay it aside. Again, although a little brandy-and-water will urge with fresh impetus the worn-out skater over the

glistening plain of ice, he will find himself less able than previously to perform those wonderful feats of precision in which accomplished skaters so much delight. Having thus endeavoured to explain the mode of action of stimulants, and to show that more or less narcotism of some portion of the nervous system is an invariable consequence of their use, let me now conclude by a few words of practical import.

From what I have said, it naturally follows that the daily use of alcoholic liquors, tobacco, or even strong tea or coffee, must be more or less injurious. At the best they are merely luxuries, and as such, ought only be used on special occasions, and in small quantities. It must be borne in mind that, although we cannot prove that a small quantity of alcohol taken occasionally will do positive injury to a healthy man, neither can this be proved of small doses of strychnine, morphia, nor arsenic. We have, however, fully demonstrated the truth of the following, viz., that whenever a man has much bodily or mental work to do, or whenever his energy becomes more or less exhausted, either by disease or otherwise, the worst possible course for him to pursue is to take a stimulant. What he then requires are rest, food, and fresh air. As a medicine, alcohol is no worse than other drugs, but the less medicine a man takes the better it will be for his health.